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THE MARKET-CART, BY GAINSBOROUGH.

GAINSBOROUGH AND HIS WORKS. II.

LIKE the Dutch artists, Gainsborough was devoted to the representation of the rural features of his own country. His figures, mostly those of country people, are in general conspicuous objects in his pictures. In the National Gallery are his two well-known pictures, the "Watering-Place" and the "Market Cart." The former represents in the foreground a piece of still water, at which some cows are drinking, and children playing among rocks, with tall trees overshadowing. The feeling of rural tranquillity is well preserved in this picture: the subject, though simple, is well calculated to exhibit the skill and character of the artist; and the effect results mainly from the contrast of bright lights and deep shadows. The tone of colouring is, however, by some thought to be heavy, and the details not well made out.

An idea of the second picture, the "Market Cart," may be conveyed by the frontispiece to our present article. We see a road overgrown with bushy trees; two country girls are seated upon a cart, loaded with turnips and other vegetables; two lads are walking, and other figures enliven the back-ground. The tone of this picture is highly rich and harmonious. According to Dr. Waagen,—

It pleases the eye by a warmth of colouring which is peculiar to Gainsborough, yet the tone of the figures is very false, the handling affected and slight, the colouring much broken. What a difference between such a picture and an old Dutch one,—for instance, an Isaac Ostado treating a similar subject! How pithy and solid is his execution! how rounded and accurately characterized every individual object, yet without neglecting the harmony of the whole.

We are, however, inclined to think that there is more justice in the general remarks of Sir Joshua Reynolds, who says:—

A novelty and peculiarity of manner, as it is often a cause of our approbation, so likewise it is often a ground of censure; as being contrary to the practice of other painters, in whose manner we have been initiated, and in whose favour we have perhaps been prepossessed from our infancy, for, fond as we are of novelty, we are upon the whole creatures of habit. However, it is certain that all those odd scratches and marks, which on a close examination, are so observable in Gainsborough's pictures, and which even to experienced painters appear rather the effect of accident than design this chaos, this uncouth and shapeless appearance, by a kind of magic, at a certain distance assumes form, and all the parts seem to drop into their proper places, so that we can hardly refuse acknowledging the full effect of diligence, under the appearance of chance and hasty negligence. That Gainsborough himself considered this peculiarity in his manner, and the power it possesses of exciting surprise, as a beauty in his works, I think may be inferred from the eager desire which we know he always expressed, that his pictures at the Exhibition should be seen near as well as at a distance.

Before resuming our memoir of his life we will distinctly notice one other painting of Gainsborough, and that a remarkable one: it is entitled "the Blue Boy." This is the portrait of a youth in a blue dress, and it is now in the gallery of the Marquis of Westminster. It has a natural elevation of look, and great ease of attitude, but the cerulean splendour of the boy's coat is at first somewhat startling. This picture owed its origin to a dispute between Gainsborough and other artists. Gainsborough's object was practically to disprove the opinion of Sir Joshua Reynolds,—that the predominance of blue in a picture was incompatible with good colouring; and in spite of the blue dress, our artist succeeded in producing a harmonious and pleasing effect. "And in truth there are," says Waagen, "in the cool shades of colours in which blue acts the chief part, very tender and pleasing harmonies, which, however, Sir Joshua, with his way of seeing, could not much approve. The Blue Boy is besides greatly distinguished for spirit and careful solid painting."

Reynolds used to say that Gainsborough could copy Van Dyck so exquisitely that at a certain distance the copy could not be distinguished from the original, or any difference be observed between them. He thought Gainsborough's manner to be peculiarly his own, and one which produced great force and effect: one day, while examining a picture of his with considerable attention, he said, "I cannot make out how he produces his effect."

As Gainsborough's circumstances improved, he felt himself enabled to indulge his peculiar tastes. He was not greatly attached to reading, but considered himself to be well read in the volume of nature, and that that was learning sufficient for him. He did not therefore much covet the intercourse of literary men, but yet he was fond of company, and passionately so of music. He esteemed a good musician as one of the first of men, and a good instrument as one of the noblest works of human skill. He in consequence devoted much of his leisure to fiddles and rebecs: he collected numerous instruments, and received at his table musical professors of all descriptions, except bagpipers. He admired Giardini and his violin,—Abel and his viol-de-gamba,—Fischer and his hautboy, and was delighted with a strolling harper who came from the Welsh mountains to Bath. Music was with him at all times a favourite topic of conversation, and during his leisure he practised by fits and starts on his numerous instruments, and his performance is said to have been worthy of praise.

One of Gainsborough's acquaintances in Bath was Wiltshere, the public carrier, a kind and worthy man, who loved the artist and admired his works. In one of his landscapes the painter wished to introduce a horse, and as the carrier had a very handsome one, he requested the loan of it for a day or two, and named his purpose: the carrier saddled and bridled it, and sent it as a present. Upon this the artist painted the wagon and horses of the friendly carrier, put his whole family and himself into it, and sent it well framed to Wiltshere, with his best respects. This picture is considered to be a capital performance. While our artist resided in Bath, but exhibited his pictures in London, Wiltshere was annually employed in the removal of his paintings, and constantly refused to accept money for his services, but being a great lover of the art, he would ask and obtain a small picture of the painter, according to the amount of carriage performed. Several of these pictures still remain in the family of the carrier, and their value is justly appreciated.

When settled in London, Gainsborough engaged in portraiture and landscape painting with fresh feeling and increasing success. He had a fine house and gallery in Pall Mall, and, though Sir Joshua was then high in favour, yet there was room for another, who, to just delineation of character, added a force and a freedom which approached, and sometimes rivalled, Van Dyck. The splendour of his colours was permanent, and to all his performances he imparted an air of truth.

A conversation or family piece of the king, the queen, and the three royal sisters, was much admired, as also were some sketches of the Duchess of Devonshire; but Gainsborough declined to send to Chatsworth a painting of her Grace, because he felt that "her dazzling beauty, and the sense which he entertained of the charms of her looks and her conversation, took away that readiness of hand and hasty happiness of touch which belonged to him in his ordinary moments."

Gainsborough never attached his name to any of his productions, and very seldom the date. One of his own chief favourite compositions was the "Cottage Girl with her Dog and Pitcher," which is, as Cunningham remarks, a happy and well-considered scene.

Such a picture is well calculated to illustrate the following spirited observations of the above-named writer:—

The chief works of Gainsborough are not what is usually called landscape, for he had no wish to create gardens of paradise, and leave them to the sole enjoyment of the sun and breeze. The wildest nooks of his woods have their living tenants, and in all his glades and his valleys we see the sons and daughters of men. A deep human sympathy unites us with his pencil, and this is not lessened because all its works are stamped with the image of Old England. His paintings have a national look. He belongs to no school; he is not reflected from the glass of man, but from that of nature. He has not steeped his landscapes in the atmosphere of Italy, like Wilson, nor borrowed the postures of his portraits from the old masters, like Reynolds. No academy schooled down into uniformity and imitation the truly English and intrepid spirit of Gainsborough.

Gainsborough lived to the age of sixty-one. Being present at the trial of Warren Hastings, he was sitting with his back to an open window, when he suddenly felt something very cold touch his neck; stiffness, and pain succeeded. On returning home, a mark was seen about the size of a shilling, which was harder to the touch than the surrounding skin, and which he said still felt cold. The use of flannel did not avail to remove it. The most eminent surgeons, however, and John Hunter among them, declared there was no danger. It turned out however, according to the presentiment of the artist himself, to be a cancer, which proved fatal. On his death-bed he sent for Reynolds to thank him for the kind and liberal manner in which he had always spoken of him in public and in private. This was the more pleasing because it was generally known that professional jealousies had existed between these artists. In a Discourse pronounced soon after the death of his rival, Reynolds thus refers to the occasion:—

I cannot prevail on myself to suppress, that I was not connected with him by any habits of familiarity: if any little jealousies had subsisted between us, they were forgotten in those moments of sincerity; and he turned towards me as one who was engrossed by the same pursuits, and who deserved his good opinion, by being sensible of his excellence. Without entering into a detail of what passed at this last interview, the impression of it upon my mind was, that his regret at losing life, was principally the regret of leaving his art; and more especially as he now began, he said, to see what his deficiencies were: which he said, he flattered himself in his last works were in some measure supplied.

These remarks on the dying artist's state of mind may teach us that whatever we allow to become the first object in life will assuredly cling to us even on the threshold of eternity; and it is therefore necessary to make the inquiry, even with respect to our most innocent and laudable pursuits, whether they are not usurping a place in our thoughts and affections, which as immortal and responsible creatures we cannot safely assign to them.

Gainsborough was buried on the 9th of August, 1788, in Kew Church-yard; according to his expressed wish his name alone was cut on the tomb-stone. Sir Joshua Reynolds, Sir William Chambers, West, Meyers, Bartolozzi, Paul Sandby, Cotes, Sheridan and others attended his funeral.

We have already expressed regret that the biography of this great artist is so meagre. There are, however, many details respecting him preserved in the fourteenth Discourse of Sir Joshua Reynolds, which must be peculiarly valuable to the student, not only as affording him the character of this master from one so well qualified to pronounce it, but also as revealing some of the methods of working whereby Gainsborough produced such charming effects. For the general reader a few extracts from this Discourse will suffice: the student will do well to study the Discourse itself.

In the early part of this performance occurs the following remarkable passage, which is alike honourable to him who uttered it and to him who is the subject of it, and which our subsequent experience in art has fully confirmed.

If ever this nation should produce genius sufficient to acquire to us the honourable distinction of an English school, the name of Gainsborough will be transmitted to posterity, in the history of the art, among the very first of that rising name.

Comparing Gainsborough with certain masters of the Roman school, he says:—

For my own part I confess I take more interest in, and am more captivated with the powerful impression of nature, which Gainsborough exhibited in his portraits and in his landscapes, and the interesting simplicity and elegance of his little ordinary beggar children, than with any of the works of that school, since the time of Andrea Sacchi, or perhaps we may say Carlo Maratti,—two painters who may truly be said to be Ultimi Romanorum.

And then, anticipating the surprise with which this bold opinion was likely at that time to be received, he adds:—

I am well aware how much I lay myself open to the censure and ridicule of the academical professors of other nations in preferring the humble attempts of Gainsborough to the works of those regular graduates in the great historical style. But we have the sanction of all mankind in preferring genius in a lower rank of art, to feebleness and insipidity in the highest.

Among the causes which led Gainsborough to the attainment of such high excellence, Sir Joshua states the fundamental one to be

The love which he had to his art, to which indeed his whole mind appears to have been devoted, and to which everything was referred; and this we may fairly conclude from various circumstances of his life, which were known to his intimate friends. Among others he had a habit of continually remarking to those who happened to be about him, whatever peculiarity of countenance, whatever accidental combination of figure, or happy effects of light and shadow occurred in prospects, in the sky, in walking the streets, or in company. If, in his walks, he found a character that he liked, and whose attendance was to be obtained, he ordered him to his house: from the fields he brought into his painting-room stumps of trees, weeds, and animals of various kinds, and designed them, not from memory, but immediately from the objects. He even framed a kind of model of landscapes on his table, composed of broken stones, dried herbs, and pieces of looking-glass, which he magnified and improved into rocks, trees, and water. How far this latter practice may be useful in giving hints the professors of landscape can best determine. Like every other technical practice, it seems to me wholly to depend on the general talent of him who uses it.

Another illustration of his great affection for his art was his custom of painting by night, since he could not amuse himself in the evening by any other means (not even by music) so agreeable to himself.

I am indeed (says Sir Joshua) much inclined to believe that it is a practice very advantageous and improving to an artist, for by this means he will acquire a new and a higher perception of what is great and beautiful in nature. By candle-light not only objects appear more beautiful, but from their being in a greater breadth of light and shadow, as well as having a greater breadth and uniformity of colour, nature appears in a higher style, and even the flesh seems to take a higher and richer tone of colour.

There is something sublime in the impression produced upon a contemplative mind, passing from hall to hall, and gallery to gallery, of a museum filled with the noblest objects of human genius, wrested from the oblivion of long departed years. As you enter each apartment, a new era in the history of the world seems to dawn upon you—and you find yourself surrounded with the most illustrious beings, by whose genius and whose actions it was distinguished and adorned. Centuries there dwindle into hours and minutes—you pass from age to age as you move from room to room—and in the lounge of a morning, you seem to have communed with the greatest characters that have appeared upon the busy theatre of the ancient world. Instead of days, months and years might be devoted to the examination of such interesting objects, and, after all, the eye of the connoisseur, and the mind of the Christian philosopher, would discover new beauties, and suggest fresh trains of thought.

OPTICAL ILLUSIONS IX.

ON BINOCULAR VISION, (*concluded.*)

IN describing the very interesting experiments of Mr. Wheatstone on the subject of binocular vision, we have given some of the figures by which he illustrates the truth of the principles which he was the first to unfold. We may now give a few others, from which it will be evident that an almost interminable number might be produced. They are arranged in pairs, each pair consisting of two *monocular* pictures, as Mr. Wheatstone very conveniently terms them; that is, pictures as seen by one eye only; one picture of each pair representing the appearance which a certain solid body would present to the right eye; the other, the appearance presented to the left. These pairs, when placed in the stereoscope, produce a combined image, in which the idea of relief is strongly impressed on the mind. In fig. 6 (*a*) the

Fig. 6. (*a*).

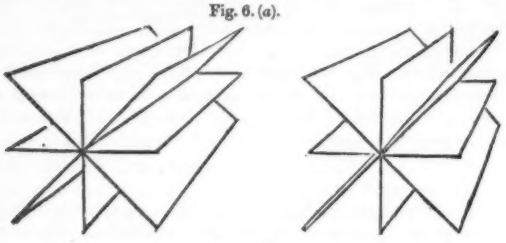


Fig. 6 (*b*).

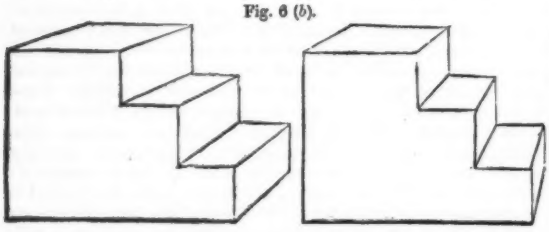
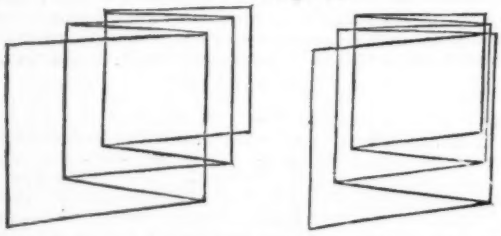


Fig. 7 (*a*).



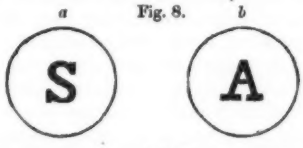
eight leaves or fans appear really to stand out in relief; so do the steps in fig. 6 (*b*); the five leaves or plates in fig. 7 (*a*); and the small tower in fig. 7 (*b*).

The results of the experiments made by aid of the stereoscope prove that if two pictures of similar size, and differing from each other only in the same degree as objects differ in their appearance to the two eyes, be viewed in the way described in our last paper, they will produce an image apparently in relief. But in order to embrace other varieties of the question, it may be asked, "What would result if the pictures were of different magnitudes?" and "What would result if they were of different forms?" Mr. Wheatstone gives the results of his investigations of these two points.

First as regards the difference of magnitude. If two squares or circles, differing a little in size, be drawn on two separate pieces of paper, and placed in the stereoscope, so that the reflected image of each shall be equally distant from the eye by which it is regarded, it will be seen that they coalesce, and produce a single image, notwithstanding the difference of size in the pictures. This experiment shows that the difference of size does not render the result discordant with those before given, but it leaves untouched the question as to what relation exists between the size of the resultant image and that of each of the pictures. This comparison may be made by placing the two drawings side by side on a plane before the eyes, and making the optic axes converge to a point either nearer or farther than the plane in which the pictures are placed: the two pictures and their binocular image being thus all brought into a line, it is found that the latter is midway in size between the other two. It is justly remarked by Mr. Wheatstone, that were it not for this binocular coalescence of two unequal images, we could never see objects clearly except when looking immediately forward; for when we look obliquely towards either side, say the right, the left eye is at that moment farther from the object than the right eye is, and consequently recognises it as being smaller in size; yet the resultant image is clearly defined, in consequence of the law just detailed.

With regard to the effect of placing two pictures of different *forms* before the two eyes, Mr. Wheatstone arrived at a very curious result, and one which seems to open an extensive field for inquiry. If two small pictures, such as *a* and *b*, fig. 8, be placed, one in each half

Fig. 8.



of the stereoscope, it might be supposed that the resultant image would be a kind of confused superposition of the one on the other; but this is not the case. The common circular border remains constant as a circle, but the letter within it changes alternately from that which would be perceived by the right eye alone to that which would be perceived by the left eye alone. At the moment of change the letter which has just been seen breaks up into fragments, while fragments of the letter which is about to appear mingle with them, and are immediately after replaced by the entire letter. It does not appear to be in the power of the will to determine the appearance of either of the letters; but the duration of the appearance seems to depend on causes which are under our control. Thus, if the two pictures be equally illuminated the alternations appear in general of equal duration, but if one picture be more illuminated than the other, that which is less so will be perceived during a shorter time.

The circumstance for which this last mentioned experiment may be deemed important, is that it corroborates certain experiments made by other philosophers on the subject of colour. It is known that if blue and yellow fragments or powders be mixed, a green colour will result; that orange results from a mixture of red and yellow, &c.; and it has been supposed by some that if one eye gazed upon a red colour while the other gazed upon yellow, or one upon blue and the other upon yellow, that the mind would appreciate in the one case an orange tint, and in the other a green, the component colours being individually lost in the blending of the two. M. de la Tour made an experiment on this point, by placing a blue disc before the right eye, and a yellow one before the left; but instead of the green tint which would appear if these two colours had mingled before their arrival at a single eye, he perceived the two colours distinctly and separately, one or the other alternately predominating either partially or wholly over the disc. Mr. Wheatstone states the result in an exactly similar manner; and it would be a very interesting question to determine, whether *other* eyes see the phenomena in the same manner. It is known that great differences exist in the power of vision, in the appreciation of colour, in the symmetrical position of the optical axes of the two eyes, &c., and it often happens that many of the results obtained by experiments are a good deal influenced by these circumstances. Could this point be definitely settled, it

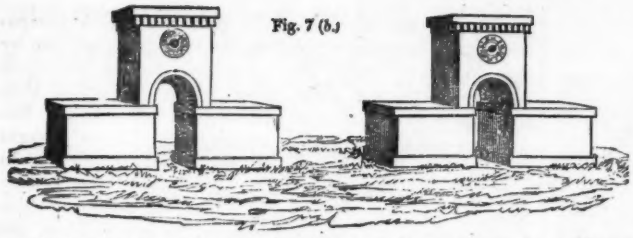


Fig. 7 (*b*)

might lead to important results, for the theory seems to show that the mind does not and cannot appreciate two images at once, as presented in the two eyes, but alternates rapidly from the appreciation of the one to that of the other.

As the experiments with the stereoscope show that there is an essential difference in the appearance of objects when seen with two eyes, or when only one eye is employed, and that the most vivid belief in the solidity of an object of three dimensions arises from two different perspective projections of it being simultaneously presented to the mind, it may be asked, how do persons, who see with *one* eye, avoid mistaking a picture for a solid object, and how do those who are accustomed to see with two eyes, avoid mistake when they close one eye? Mr. Wheatstone answers these questions thus.—Although the simultaneous vision of two dissimilar pictures suggests the relief of objects in the most vivid manner, yet there are other signs which suggest the same ideas to the mind, which, though more ambiguous than the former, become less liable to lead the judgment astray in proportion to the extent of our previous experience. The vividness of relief, arising from the projection of two dissimilar pictures, one on each retina, becomes less and less, as the object is seen at a greater distance before the eyes, and entirely ceases when it is so distant that the optic axes are parallel while regarding it. We see with both eyes all objects beyond this distance precisely as we see near objects with a single eye; for the pictures on the two retinæ are then exactly similar, and the mind appreciates no difference whether two identical pictures fall on corresponding parts of the two retinæ, or whether one eye is impressed with only one of these pictures. A person deprived of the sight of one eye sees therefore all external objects near and remote, as a person with both eyes sees remote objects only; but the vivid effect arising from binocular vision of near objects is not perceived by the former: to supply this deficiency he has recourse unconsciously to other means of acquiring more accurate information; of which the principal is the motion of the head. The manner in which the movement of the head furnishes this collateral evidence is thus explained:—The mind associates with the idea of a solid object every different projection of it which experience has hitherto afforded; a single projection may be ambiguous, from its being also one of the projections of a picture, or of a different solid object; but when different projections of the same object are successively presented, they cannot all belong to another object, and the form to which they belong is completely characterized. While the object remains fixed, at every movement of the head it is viewed from a different point of sight, and the picture on the retina consequently continually changes.

The reader will remember, that in one of our former papers on optical illusions, we described the appearance which a hollow cavity, such as the interior of a shallow vessel, or an intaglio, or seal, presents when viewed under particular circumstances; it appears to the eye to be convex instead of concave; a seal or intaglio appearing to have been converted into a cameo. We explained that this apparent change or illusion is brought about principally by the mode in which light and shadow are distributed over the object; but Mr. Wheatstone attributes the effect partly to circumstances which have already been explained in these papers.

There are other branches of this interesting and extensive subject, into which Mr. Wheatstone partly enters; but as he gives us ground for hope that he will at some future period publish the results of further experiments thereon, we will not here present those features which are as yet imperfect. We will, therefore take leave, till some future time, of these important contributions to the physiology of vision.

We cannot refrain from expressing a hope that the reader will repeat all these interesting and instructive experiments. The stereoscope is an instrument which may be easily and cheaply constructed. For all ordinary purposes the screw might be dispensed with and a lateral movement given to the flaps E E′, fig. 4 (*a*), by means of hinges. The various figures must be drawn accurately and neatly on drawing-paper or card; the right-hand figure on one piece, and the left-hand figure on another. Should the young student find any difficulty in procuring the two little mirrors, let him purchase two pieces of plate glass of the required size, and silver them himself according to the following simple directions, which we borrow from Mr. Tomlinson's *Student's Manual of Natural Philosophy*.

To construct a *plane* mirror,—procure a piece of plate-glass, and polish it until perfectly clean. Then cut out a piece of tin foil of the exact size of the glass: let the foil be quite smooth and free from wrinkles and holes. Place it on any smooth and level surface, and cover it with a layer of clean mercury: then having gently smoothed the surface of the mercury, by means of a piece of cotton wool, or a hare's foot, the under surface of the mercury will combine with the foil; the upper surface being brilliant and reflective. Then place a piece of stout paper of greater extent than the intended mirror upon this amalgam; and lay the glass upon the paper exactly over the amalgam. Press firmly upon the glass; and draw out the paper in a steady equable manner: this will exclude the air from between the amalgam and the under surface of the glass. The glass will thus be evenly coated with the amalgam, and a plane mirror will be formed; which must not be taken up directly; but left under pressure of a heavy weight for a few hours, during which time the surface on which the mirror rests should be gradually sloped in order that all superfluous mercury may drain off.

Manchoo Tartary

Is tributary to both China and Japan, but dependent on the latter The men are athletic, tall, and jealous of their women, and the country not unlike parts of the western coast of Scotland. They live chiefly on vegetables, varied at times by puppy's flesh; in many of the houses we found these little creatures fattening for their fate; for, although they have plenty of bullocks, they employ them only for agricultural purposes; and all through China and along this coast, milk, a principal article of diet among European peasantry, is not used. We remarked that the Chinese at Chusan laughed immoderately at our soldiers milking the goats, as they think it unnatural that man should drink the milk of animals. However, the Tartars to the westward are said by travellers to live almost entirely on the milk obtained from the camel; so this must be a prejudice which the people of Manchoo have derived from the Chinese.

We found the most useful articles of barter here were the brass buttons on a naval jacket, the worth of one being estimated far higher than a Spanish dollar, of which they did not seem at first to comprehend the value; for a button, kindly furnished me from the jacket of a friend, I became the owner of a sheep and some poultry, and, I suspect, both purchaser and seller were equally proud of their ability at barter.

Their houses are much the same as in China, but the mode of cultivating the land must be here laborious. All the hills are terraced to the summit, on account of the severe rains to which they are subject, and which often sweep the whole side of a hill into the valley below. Traces of these devastations meet the sight on every side, showing how necessary is the precaution.—*Six Months with the Chinese Expedition.*

ON SHOOTING STARS.

FOR some years past a periodical phenomenon has occurred on the 9th and 10th of August, and still more strikingly on the 12th and 13th of November, to which the attention of astronomers and meteorologists has been drawn in a marked degree, viz., the appearance of a very large number of meteors or shooting-stars.

What these shooting stars are we are little able to surmise. Aërolites, fire-balls, shooting-stars, and other phenomena of somewhat analogous kinds, have attracted attention from early ages, and numerous theories have been advanced to account for their formation. Soon after Franklin made known his researches in electricity, an opinion was formed that shooting-stars were due to some electrical action going on in the atmosphere. Afterwards Chladni, a celebrated German philosopher, conceived that the origin, both of those bodies which actually fell to the earth, and of those which merely appeared luminous in the heavens, might be accounted for in some such way as the following: that these meteors are masses of matter, moving through space with velocities equal to those of the planets; that when they encounter the earth's atmosphere they become inflamed by the resistance and friction, and thence rendered luminous; and that some of them burst into pieces, and scatter masses of stone and iron on the ground. This theory was ridiculed by some and supported by others, but attention was not so strongly drawn to the subject until it was observed that the luminous meteors appeared in greater abundance about the dates above mentioned than at any other periods of the year.

Sir William Hamilton, after describing an eruption of Vesuvius, which took place on the 9th of August, 1779, spoke of a phenomenon which occurred in the following night.

It was universally remarked (said he) that the air this night, for many hours after the irruption, was filled with meteors, such as are vulgarly called falling-stars. They shot generally in a horizontal direction, leaving a luminous train behind them, but which quickly disappeared. The night was remarkably fine, starlight, and without a cloud. This kind of electrical fire seemed to be harmless, and never to reach the ground, whereas that with which the black volcanic cloud of last night was pregnant appeared mischievous, like that which attends a severe thunderstorm.

Professor Quetelet, of Brussels, has collected numerous proofs of similar phenomena having occurred within the last few years, on the 9th and 10th of August. Similar exhibitions have taken place during the first week in August, but the 9th and 10th seem to be the most conspicuous days. At a meeting of the Astronomical Society about two years ago, Professor Schumacher gave an account of some August meteors which he had observed in conjunction with several other astronomers, and other scientific bodies have received numerous communications of a similar kind.

But the November meteors are still more numerous than those of August. The first recorded observations of which we are aware is that of the 11th of November, 1799, when Humboldt and Bonpland observed many thousands of shooting-stars within a few hours, at Cumana, in South America, and in the same night similar meteors were observed by different persons throughout almost the entire extent of America, as well as in some parts of Europe. On the 12th of November, 1832, philosophers in every part of Europe saw numerous displays of these bodies, but the following year, 1833, presented a phenomenon which surpassed everything previously seen. From the accounts which Professor Olmsted gave of what he saw on the 12th of November in that year, at a place in North America, M. Arago computed the number of meteors on that night at not much less than a quarter of a million! In the years 1834, 1835, 1836, and 1838, similar exhibitions, more or less extensive, have been noticed in many parts of the world; but it has been stated that 1839 and 1840 were not so prolific in them.

Before giving an outline of the theories which have been offered in explanation of these phenomena, it may be well to state what is known respecting their height and velocity.

No experiments seem to have been made for the determination of the height and velocity of shooting-stars until the year 1798, when Brandes and Benzenberg, two German astronomers, undertook a series of observations for this purpose. Having selected a line, about nine miles in length, they stationed themselves at its extremities, and began to observe on nights previously agreed on. When a meteor was seen they immediately traced its apparent path on a celestial map, noticing carefully the exact times of its appearance and extinction, with any other circumstances likely to assist in identifying it. Several of the meteors were sufficiently identified to make it certain that they were seen by both parties, and the recorded results, when worked out by the aid of trigonometry, gave tolerable indications of the heights and velocities of the meteors. Of twenty-two computations thus obtained, it was found that one gave the height of the meteor about 6 English miles above the surface of the earth; six others were between 6 and 45 miles high; nine were between 45 and 90 miles; and six were above 90 miles, one being as much as 140. With respect to velocities there were only two observations which could be depended on, one of which gave a velocity of about 21 miles, and the other 25 miles per second,—a velocity exceeding that of the earth. It was noticed as a remarkable circumstance, and one deserving of attention in reference to any theories on the subject, that one of the meteors moved *upwards*, or away from the earth.

About the year 1823 another attempt, on a more extensive scale, was made to measure the heights and velocities of meteors. The German observer, Brandes, assisted by several other persons, made a series of observations, from April to October, 1823, in Breslau and the neighbouring towns. During this interval more than eighteen hundred shooting-stars were observed by some or other of the parties, but only about a hundred of these were observed simultaneously at different places, so as to afford the means of computing the heights and velocities. Of these meteors, the altitudes of four were computed to be under 15 miles; fifteen were between 15 and 30 miles; twenty-two were between 30 and 45 miles; thirty-five were between 45 and 70 miles; thirteen were between 70 and 90 miles; and eleven were above 90 miles. The four highest had altitudes of 140, 220, 280, and 460 miles, respectively. Of those meteors whose directions of motion was sufficiently determined it was found that twenty-six had a motion downwards, nine upwards, and one horizontal. With respect to the velocities with which they move, only three computations were made which could be depended on, and these gave velocities of 23, 28, and 37, miles in a second, respectively,—all being greater than the velocity of the earth in its orbit.

In 1824 M. Quetelet made a similar series of observations in Belgium; the results of which gave, as the velocity of the various meteors which he measured, from 10 to 25 miles, the mean being a little less than the velocity of the earth in her orbit. In August, 1838, M. Wartmann, and several assistants, made an extensive series of observations of a similar kind in Switzerland. Some of the observers stationed themselves at Geneva, while the others were stationed at Planchettes, a villa at about sixty miles distant. On the 10th of August, in the space of about seven hours and a half, nearly four hundred meteors were observed at Geneva; while those at Planchettes observed rather more than a hundred; and from a comparison of the two sets of observations, it was found that the average of height of those which had

been observed at both stations was more than 500 miles; while the velocities attained the startling amount of 240 miles in a second.

Such are the results of the observations which have been made on the heights and velocities of these meteors; and we next speak of the theories which have been framed to account for them. Mr. Galloway, in a paper read before the Astronomical Society a few months ago, divides these theories into five classes, and states some of the objections which may be urged against each.

1. Benzenberg, and some other observers, suppose that shooting stars and fire-balls are substances projected from volcanoes in the moon. If a body were projected vertically from the surface of the moon with a velocity five times greater than that of a cannon-ball, it is capable of calculation, on the theory of gravitation, that the projectile would reach a point in space where the earth's attraction is stronger than the moon's, and would consequently then fall to the earth. Benzenberg, in accordance with this theory, supposes that shooting stars are small masses of stone, from one to five feet in diameter; which are projected from lunar volcanoes, and instead of falling on the surface of the earth, are whirled round it in a kind of orbit. The objections to this theory are the extraordinary numbers which appear at intervals, and the *periodicity* of the August and November meteors.

2. The second theory, proposed by Dr. Olbers, is, that the shooting-stars are the *débris* or fragments of a large planet, burst into pieces by some internal explosion, and of which the asteroïds, Pallas, Ceres, Juno, and Vesta are the principal remaining portions. These small fragments he supposes to circulate about the sun in very elongated orbits; and that when they approach the region of space through which the earth is moving, they enter the earth's atmosphere, and by reason of the resistance and friction are rendered luminous, whereby they present to us somewhat the appearance of stars.

3. M. Biot supposes that these meteors have a close connection with the zodiacal light. This is a lens-shaped portion of the heavens which presents a slightly luminous or nebulous appearance, similar to that called the "milky way." It is objected to this theory, that as the earth passes obliquely through the plane of this zodiacal light, it must vary in its distance therefrom, and that therefore the shooting-stars ought to present very different appearances at different times; whereas, they are nearly alike all the year through, although more plentiful at some periods than others.

4. Arago and many other astronomers suppose that independently of the great planets, there exist in the planetary regions myriads of small bodies which circulate about the sun, generally in groups or zones; and that one of these zones intercepts the ecliptic about the place through which the earth passes in November. It would appear from a letter which Sir John Herschell sent to the Athenæum Journal a few weeks ago, that he coincides in this opinion so far as relates to the August meteors. He says:—"The meteors of August 9, 1840, in so far as I observed them, radiated almost without exception from a point in the heavens very near the star γ (gamma) in the constellation Perseus: which is almost coincident with the point (near the star B Camelopardali) from which I observed them to emanate on the 10th of August, 1839." Facts of this nature appear almost decisive in favour of the opinion, that a zone or zones of these bodies revolve about the sun, and are intersected by the earth in its annual revolution.

Mr. Galloway adduces five classes of objections to this hypothesis. First.—That bodies moving in groups in this way, would necessarily move in the same direction, and consequently, when they become visible from the earth, they would all appear to emanate from one point, and move towards the opposite; whereas shooting-stars are observed on the same nights to emanate from all points of the heavens, and to move in all possible directions. Secondly.—The average velocity at which these shooting-stars seem to move greatly exceeds that which any body circulating about the sun can have at the distance of the earth. Thirdly.—From the luminous train which they generally leave behind them; from their being situated within the earth's shadow, and at heights far exceeding those at which the atmosphere can be supposed capable of supporting combustion, it follows that their light, instead of being reflected from the sun, is self-supported, contrary to every analogy of the solar system. Fourthly.—If the shooting-stars be solid matter, passing within a few hundred miles of the earth, many of them would inevitably be attracted to it; which has never yet been known to occur. Lastly.—Some of the shooting-stars are seen to move in a path inclining upwards; a fact which is difficult to reconcile with the theory.

5. The last theory to which we shall allude is, that advanced by Capocci of Naples. He supposes the Aurora Borealis, shooting-stars, aërolites, and comets, to have a common origin, and to be due to the aggregation of atoms of matter, brought into unison by magnetic action. He supposes, that in the planetary spaces there exist bands or zones of nebulous particles, more or less fine, and endued with magnetic forces, which the earth traverses in its annual revolution; that the smallest and most impalpable of these particles are occasionally precipitated on the magnetic poles of our globe, and form polar auroras; that the particles a degree larger, in which the force of gravitation begins to be manifested, are attracted by the earth, and appear as shooting-stars: that the particles in a more advanced state of concretion give rise in like manner to the phenomena of fire-balls, aërolites, &c.; that the comets, which are known to have very small masses, are nothing else than the largest of the aërolites, which in course of time collect a sufficient quantity of matter to be visible from the earth.

It will be seen from these details that the present state of our knowledge is inadequate to explain the subject of shooting stars. Our ignorance of a subject is often well displayed by the many conflicting theories which accompany it; but we are generally so anxious to explain, that time is not allowed to collect materials necessary to an explanation. Probably many years of accurate observation will be necessary to form a consistent theory on a subject which has only just begun to be included among the *periodical* phenomena of nature.

GARDEN-HERBS. XI.

Hyssop.

Dioscorides, that gave so many rules for the knowledge of simples, hath left Hyssop (*Hyssopus Arabum,*) altogether without description, as being a plant so well known that it needed none: whose example I follow. A second kind of hyssop (*H. arabum flore rubro,*) is like the common hyssop, and differeth in that, that this hyssop hath his small and slender branches decked with fair red flowers. A third kind (*H. albis floribus,*) differeth only in having flowers as white as snow. The fourth kind (*H. tenuifolia*) is of all the rest of the greatest beauty; it hath a woody root, tough, and full of strings, from which rise up small, tough, and slender flexible stalks, whereupon do grow infinite numbers of small fennel-like leaves much resembling those of the smallest grass, of a pleasant smell and aromatic taste, like unto the rest of the hyssops, but much sweeter; at the top of the stalks do grow among the leaves small hollow flowers of a bluish colour tending to purple. We have in England in our gardens another kind like unto the former, but the leaves are some of them white, some green, as the other, and some green and white, mixed and spotted, very goodly to behold. Of which kind we have moreover in our gardens another sort, whose leaves are wonderfully curled, rough and hairy, growing thick thrust together, making as it were a tuft of leaves; in taste and smell, and in all other things like unto the common hyssop.—Gerard.

Hyssop has nearly the same name in most European languages, and is derived from the Hebrew word *azub,*

which has been variously translated; but its most probable signification is a holy herb, or herb for purifying holy places. At the institution of the Passover, Moses commanded the Israelites to take a bunch of hyssop, and dip it in the blood of a lamb, and to sprinkle the lintel and the door-posts. (Exodus xii. 22.) It was also used by the priest at the cleansing of persons afflicted with leprosy, as well as for purifying the house of the leper. (Leviticus xiv. 4, 49, and 52.) These, and other passages of Scripture, do not refer to the plant which now bears the name of hyssop. A modern authority is of opinion that the hyssop of Scripture is the *Phytolacca decandra*, or that it belonged to the genus in which this plant occurs. The length and straightness of the stem are characteristic of the various kinds of phytolacca, and afford an obvious reason why the Roman soldier placed a sponge filled with vinegar upon hyssop in order to raise it to the lips of our Saviour. (John xix. 29.) The *Phytolacca decandra* and other species of the genus, contain a considerable quantity of potash, so that a hundred pounds of its ashes afford forty-two of the caustic alkali; hence, an illustration is afforded of the passage in Psalm LI.,—"Purge me with hyssop, and I shall be clean."

The accompanying cut and description we borrow from the *Bible Cyclopædia*:—

The phytolacca belongs to the family *Chenopodeæ*, in which the barilla plant is found, but it is unlike the rest of its congeners in the extreme beauty of its flowers, and the berries by which they are succeeded. These flowers are generally of a fresh and lively pink, disposed in elegant clusters. The berries are compounded of a circle of carpella, or minute fruits closely joined together. The leaves are generally smooth, and neatly shaped, and the stem is long, smooth, and wand-like. It usually rises to about a foot and a half in height, but in Palestine it sometimes exceeds two feet.

Burder says,—

Salmasius, cited by Wolfius, proves that there was a species of hyssop whose stalk was sometimes two feet long, which was sufficient to reach a person on a cross, that was by no means so lofty as some erroneously imagine.

Some authors have imagined that the hyssop of Scripture is the shrub which we call Winter Savory: but this opinion is contradicted by Pliny, who gives an account of savory and another distinct account of hyssop: he says that the best hyssop grew on Mount Taurus in Cilicia, and next to that the hyssop of Pamphylia was most esteemed. He describes it as a herb not friendly to the stomach. The Romans used it with figs as an aperient. and with honey as an emetic: and a plaster formed from it was thought to be a remedy for the sting of serpents. Five sprigs of hyssop, and two sprigs of rue, boiled with three figs are recommended by him as an excellent drink to relieve the chest.

Aiton notices three species of hyssop and four varieties of the common sort, the earliest of which was cultivated in England in 1548. The species of hedge hyssop noticed by this author are exotics; but as early as the year 1590, Gerard states that he found the broad-leafed hedge hyssop growing wild:—

It groweth in moist places. I found it growing upon the bog or marrish ground, at the further end of Hampstead Heath, and upon the same heath towards London, neere unto the head of the springs that were digged for water to be conveied to London, 1590, attempted by that careful citizen Sir John Hart, Knight, Lord Maior of the Citie of London: at which time myself was in his Lordship's company, and viewing for my pleasure the same goodly springs, I found the said plant not heretofore remembered.

Mr. Henry Phillips has collected a number of authorities to show the high estimation in which hyssop was held during the palmy days of the herbalists Dodoens wrote much on the medical virtues of this herb; he recommends a decoction of this plant with figs, rue and honey, boiled together, as good for the complaints of the chest, shortness of breath, and hard dry coughs: when given with figs he says it is an excellent vermifuge, and is an admirable gargle for the mouth and throat. He states also that hyssop boiled in vinegar, and held in the mouth, eases the tooth-ache; and that the decoction removes congealed blood occasioned by bruises, and takes off the black or blue marks. Later authors have greatly commended it in cases of bruises; it may be applied either as a cataplasm, or a little bundle of the plant put into linen rag and applied to the part. Ray gives an account from Mr. Boyle of a violent contusion from a kick of a horse which was happily cured by this herb, boiled and applied as a cataplasm. He says, that the violent pain was almost instantly removed, and the very mark and blackness taken off in a few hours. It is probable, however, that in modern practice a simple fomentation of water would be thought as effectual as any medicated preparation of the herbalists.

Riolanus the elder speaks of the efficacy of hyssop in sugillations* of the eyes:—

I found by experience (says that physician,) the truth of what Archigenes affirms, in Galen, which is, that if the tops of hyssop be tied up in a cloth, and boiled in water, and the cloth afterwards applied warm to the livid eye, the blood will be attracted by the hyssop to such a degree as to stain the linen. Upon this authority I have, several times, prescribed a decoction of hyssop against sugillations, even of the eyes; only, instead of water, I sometimes ordered the bag to be boiled in wine; and directing the application of it somewhat warm to the eye-lids, when the patient went to bed, his eyes being shut, the lividness was removed as well as I could wish.

Phytolacca decandra.

* This word is expressive of the black and blue marks produced on the body by strokes. It is derived from the Latin *sugillare*.

LLOYD, in his *State Worthies*, gives the following account of Sir Edward Coke:—"His parts were admirable; he had a deep judgment, faithful memory, active fancy. And the jewel of his mind was put into a fair case,—a beautiful body with a comely countenance;—a case, which he did wipe and keep clean, delighting in good clothes, well worn, and being wont to say, that the outward neatness of our bodies might be a monitor of purity to our souls."

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